DOCUMENT RESUME

ED 086 616 SO 006 842

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TITLE Piaget's Geographical Spatial Stages: An Examination of Their Relationship to Elementary Children's Classification-Class Inclusion Abilities.
PUB DATE Nov 73
NOTE 33p.; Presented to the Annual Meeting of the National Council for Geographic Education (59th, Washington, D.C. Nov. 1 through 3, 1973)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Abstract Reasoning; *Classification; *Cognitive Development; Cognitive Measurement; Cognitive Tests; *Concept Formation; Educational Research; Elementary School Students; Geographic Concepts; Geography; *Geography Instruction; *Space Orientation
IDENTIFIERS *Piaget (Jean)

ABSTRACT

This study examines the relationship between a child's concept of geographic and territorial relationships and his competence on classification and class inclusion measures. Jean Piaget's stages of development and studies conducted by other investigators (Jahoda, 1964; Stoltman, 1971; Rand and Towler, 1973; Flavell, 1963; Asher, et al, 1971; Kofsky, 1966) on geographic relationships and classification provide a comparative framework. One hundred and twenty students from two Indiana schools were administered a Geographical Stages Test and a Logical Thinking Test. Analysis of the test results indicate that Piaget's spatial stages do not adequately describe the sample of children, although the correlation between the tests is significant, as Piaget postulates, and that age is the only significant variable among the possibilities of age, sex, socioeconomic status and residence. By implication teachers should make allowances for the varying competence of students, provide practice in classification and inclusion, and provide verbal and spatial experiences in the classroom to reinforce understanding. (Although tables are provided their reproducibility is doubtful). (JH)

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Piaget's Geographical Spatial Stages: An Examination of Their Relationship to Elementary Children's Classification-Class Inclusion Abilities

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SP006842

A Paper Presented to the
Annual Meeting of the
National Council for Geographic Education
November, 1973
Washington, D. C.

The developmental theories of Jean Piaget have been of great interest to educators and psychologists since they have been concerned with examining the course of a child's cognitive growth. While Piaget has examined such wide areas of cognitive development as reasoning, judgement, and logical thought processes, he has continually used what have been traditionally thought of as school subject areas to explain and clarify his cognitive developmental theories. It is one of these areas that this paper examines, that of the child's knowledge of geography and geographic relationships. In addition, this paper also seeks to examine the relationship between general classification-class inclusion abilities on the part of the child with those more specialized geographic classification and class inclusion abilities.

Piaget (1928, 1951) proposed a spatial stages theory which attempts to explain how the child is gradually able to comprehend the various geographical units in which he lives, and to gradually integrate these units into a logically correct and consistent hierarchy. When reporting the results of inquiries about the nationality conceptions of Swiss children, Piaget soon found that when children were asked about their city, state, and nation, they exhibited marked pecularities and appeared to pass through rather distinct developmental stages. In the first stages, all the territories, regardless of actual size, are of approximately equal magnitude in the children's eyes. Further, the territories of town, canton, and national state are mutually exclusive, and no one territory is singled out. Piaget also noted that children at stage one, up through approximately age seven, usually had no real idea of the territory in which they lived. Often they had only the vaguest notions about their own city.

Stage two children, ages 8-9, were distinguished by the ability of the child to correctly represent Geneva as a smaller circle inside of a larger circle representing Switzerland. This was a further stage in the process of decentration, which Piaget had described as a moving outward from the center. However, while Piaget noted that the child could now often express the verbal formula that city is included in state, and could often demonstrate this arrangement spatially when requested to do so, he appeared not to understand that one could be logically included in the other. The child did not understand that a part which is fitted into the whole does actually form part of the whole. Piaget speculated that while the decentration and integration of territories was indeed underway in these children, it was a transition stage which could, and did, cover a multitude of misconceptions.

During the third stage, which Piaget placed at about ages 10-11 and onward, the child understood the correct territorial and logical relationships and was able to synthesize them correctly. It is in this stage that the notion of homeland or nation became a reality in the child's mind. Stage three then was marked by the child's ability to decenter territory to the national level so that the correct inclusion relationship between city, canton, and nation is realized both territorially and logically. The child was able to demonstrate this relationship spatially, by means of correct placement of circles, as well as to justify the relationship of the circles verbally.

Other examiners have also investigated Piaget's notions of spatial stages in children, and have attempted to apply Piaget's findings to other samples of children. Jahoda (1964) attempted

a replication study using Scottish children between the ages of six and eleven years from two socioeconomic classes in the city of Glasgow. While Johoda felt that there was general agreement with Piaget's hypothesis, he also found variance in several areas. Jahoda noted a gross deficiency of his Glasgow children in Piaget's stage two. Further, almost one-quarter of Jahoda's children had to be excluded from Piaget's stages since they did not fit Piaget's descriptions of those stages. Jahoda suggested that what had occurred was that Piaget had relied much more heavily upon the children's responses to questions of nationality than spatial placement in assigning children to stages. Jahoda suggested that the comprehension of spatial relations does not necessarily precede that of nationality relations. Jahoda suggested that if a composite of children's abilities on both verbal and spatial understanding were used, a wide variance would be noted from Piaget's stages.

Jahoda also systematically introduced the variable of socioeconomic status into his study and found wide differences between the rate of progression through the stages for both of his socioeconomic groups. Scottish children in general seemed to lag behind the norms proposed by Piaget, and working class children progressed more slowly through the stages than did middle class children.

Stoltman (1971) also attempted to verify Piaget and Jahoda's results using a sample of American children. In addition, Stoltman introduced the additional variables of race and rural-urban residence. Stoltman also found wide variance from Piaget's stages. Stoltman constructed hypothetically expected frequencies which could be expected based upon Piaget's theoretical descriptions of

his stages, and found that his observed frequencies of children's responses were significantly different form the theoretically expected frequencies with the American children decentering at a lesser rate than was theorized. The American children, like the Scottish children, progressed more slowly through the stages than did Piaget's sample.

Like Jahoda, Stoltman also found significant socioeconomic differences with lower socioeconomic children progressing through the stages more slowly than their middle class counterparts.

Stoltman also found differences between races, with black children progressing through the stages more slowly than white children. However, Jahoda attributed much of this effect to the overlap between social class and race, since most of the black subjects were included in the lower socioeconomic classes. Stoltman reported no significant difference between children from different residential areas but noted that this contradicted most of the previous research on urban-rural residence.

Rand and Towler (1973) also examined a large sample of American children on several Piagetian territorial tasks, and concluded that while age-stage relationships appeared to be present, there was wide variation in the rate of territorial concept attainment, and further, that there was a wide variance between expected performance on Piagetian stages and the children's actual observed performance, thus giving support to Jahoda and Stoltman. In addition, Rand and Towler examined children's conceptions of nationality and foreignness and found that American children also lagged behind the age norms predicted by Piaget. Further, by constructing stages based upon the child's ability to name and comprehend foreign countries, Rand

and Towler found that most children confused the territorial designations of states, countries, and continents, and were only able to separate these concepts at a much later age than would be theoretically expected. Rand and Towler surmised that this added support to previous contentions that American children were more retarded than Piaget' sample in progression through spatial stages.

In examining children on geographic and spatial concepts, Jahoda (1964) reported that boys do significantly better than girls on territorial decentration tasks. However, Stoltman (1971) reported that there were no significant sex differences in his study of territorial concept attainment.

Several reasons have been proposed for the child's progression through these spatial stages. Both Piaget (1928, 1951) and Jahoda (1964) have suggested travel experiences and environmental circumstances as being partially responsible for this process of territorial decentration. Stoltman (1971) and Rand and Towler (1973) have also alluded to these influences. However, Piaget (1951) suggests that one reason for the child's inability to understand the territorial relationships involved in progression through his spatial states is the child's inability to include classes with each other. The child lacks the ability of class inclusion, or the fact that logical categories can be included one in another. The child does not think of the part in relation to the whole. The fault lies in the child's incapacity to logically multiply classes, or the child's inability to understand that there can be an intersecting of classes. Instead of this intersection of classes, the child simply juxtaposes classes. Piaget notes further (Piaget and Inhelder, 1963) that the child thinks about things

absolutely and not in relation to each other, thus demonstrating a lack of the understanding of class relations.

Like his theory of spatial stages, Piaget also proposed a stage theory of how a child proceeds through competence in the areas of classification and class inclusion. Stage One occurs during the ages of about 2-5 years and is characterized by the child's inability to classify objects correctly due to errors of reasoning characterized by the child's inability to operate under a system of rules. During this stage the child constructs what Piaget calls figural collections which are not true classes but simply random collections of objects. The child at this stage has great difficulty mastering class inclusion relationships.

At stage two, from about ages 5-7, the child makes what appear to be legitimate collections of classifications. But, the child does not understand relations and the way in which the elements within the class are related to the class as a whole. The child, according to Piaget, has no clear understanding of the inclusion relationship, or the fact that a smaller subordinate class may be included in a larger, superordinate class.

During stage three, from about 7-11 years, the child constructs hierarchical classifications and can comprehend class inclusion relationships. However, this understanding occurs only at the concrete operational level, since the child cannot classify according to imaginary relations, but only to mental representations of concrete objects or events.

Other investigators have attempted to verify Piaget's results regarding classification and many of these are reviewed in Flavell (1963) and Asher, et.al. (1971). One of the most extensive of

these studies was reported by Kofsky, (1966) who derived a hierarchy of steps based upon Piagetian principles of classification, multiple classification, and class inclusion. Kofsky's results were generally consistent with Piaget's formulations and she found that simple classification abilities were followed by multiple classification abilities which were in turn followed by the concepts of class inclusion.

Piaget's research has provided a theoretical framework for understanding children's acquisition of geographic concepts and relationships. Subsequent studies have sought to further examine this theoretical framework, and while these studies have generally agreed with Piaget's original results, wide variations in the rate of progression through Piaget's stages have been noted when examining various samples of children differing as to race, place of residence, and socioeconomic status. In addition, no clear explanation of why children progress through these stages has been offered. While the relationships between general classification and class inclusion abilities and those of geographic classification and inclusion have been alluded to, these relationships have not been specifically examined. Further, no single investigation has attempted to compare the relationships existing between the various methods of examining children's understanding of geographical and territorial concepts and relationships.

Accordingly, this study will seek to examine the relationship between the child's conception of geography and territorial relationships with that of the child's competence on classification and class inclusion measures. Further, this study will attempt to synthesize the various tasks used by previous investigators and

attempt to discover what relationship exists between the various tasks used by these researchers to see if they are, in fact, measuring the same kinds of territorial concept acquisition competencies. In addition, this study will also seek to examine the progress of midwestern American children through their understanding of the spatial stages proposed by Piaget. It will also seek to examine the relationship between the performance of these middle western children on Piaget's spatial stages and those studied in previous investigations by Jahoda and Stoltman. This study will also examine the relationship of the variables of sex, urban-rural residence, and socioeconomic status on children's performance in acquiring territorial conceptions of geography and nationality.

Methods and Procedures

The subjects for this study were selected from two separate schools in Indiana. The first of these was a rural school in northeastern Indiana while the second was a suburban school located on the edge of a northeastern Indiana community. From each school, sixty children were randomly selected. These children were stratified according to grade (n = 10) and were evenly divided between boys and girls. Because a close correspondence was expected between age and grade level, no attempt was made to select according to age. In addition, data was collected from each child's individual records for purposes of classification on Hollingsheads' two factor index of social position (Hollingshead, 1957). The total sample was thus composed of 120 students stratified by grade, sex, location of school, and socioeconomic status.

Two instruments were utilized for this study. The first of these was the Geographic Stages Test. This instrument was based upon the work of Piaget and previous investigators and attempted to incorporate features from previous research by those other investigators for purposes of standardization and comparison. The test was composed of several sections, each designed to elicit specific information from the child. The first subsection, Verbal Geographic Stages, was designed to assess the child's verbal understanding of the various political units in which he lived. The second subsection, Spatial Stages-Circles, was designed to disclose the child's conception of the relationship among the various political units in which he lived. This was done by having the child draw circles representing those units. The third section, Spatial Stages-Props, was designed to elicit the child's representation of relationships between geographical units by having the child manipulate a series of props made from cardboard. The fourth section, Nationality Stages, was designed to verbally assess the child's conceptions of territorial inclusion relationships and that of multiple classification. The final subsection was designed to verbally assess the child's conception of the reciprocal relationship implicit in the concept of foreigner.

The second instrument, the Logical Thinking Test, was originally devised by Rand and Towler (1972). The purpose of this test was to assess a child's general competence in classification and multiple classification. In addition, two additional subtests were devised which were designed to assess children's performance in single attribute classification competence, and in class inclusion ability. The test was designed to be administered to

groups by means of a slide and tape presentation. The measure was thus composed of four separate subtests.

The first subtest, Single Classification, was designed to assess the child's ability to classify objects on the basis of a single similar attribute. The second, Multiple Classification-Matrices, consisted of a series of matrices, consisting of a four by four pattern of sixteen elements containing an ordered pattern of up to three attributes of color, form, size, and size pattern. The subject was required to pick an element that would complete the matrix from a series of choices. Both two and three attribute items were used. The third subtest, Multiple Classification-Row and Column, consisted of a set of row and column intersections with the inter-section left blank. Again, the child was requested to choose the element that would complete the pattern. The fourth subtest, Class Inclusion, was designed to assess the child's class inclusion ability by asking him to compare the relative sizes of subordinate to superordinate groups.

For each test, several scores were derived. The Logical Thinking Test yielded a score for each subtest, as well as for the total test. In addition, scores were also computed for single, double, and triple attribute classifications. All scores were simply computed on the basis of the number of items correct for each section. The Geographic Stages Test was not designed to yield a total score based upon the number of correct responses, but instead, yielded a classification in one of the spatial stages described by Piaget and/or later investigators.

Each of the subtests also yielded an assignment to an appropriate stage. In addition, each student was given an overall stage placement based upon his composite classification from scores on the first four subtests.

Hypothetically expected frequencies based upon the work of Piaget and Stoltman were constructed for each subtest and the total test. This hypothetical distribution is presented in Table One. Distributions between these theoretically expected distributions and the observed frequencies based upon the children's actual responses for the Geographic Stages Test were then examined by means of Chi-square analysis.

Results

The hypothesis that there would be no significant differences between observed frequencies of children's scores and a hypothetically expected distribution for total test score and for each of the subtest scores was tested using the chi-square test for goodness of fit. Results are presented in Table Two. This analysis revealed significant differences between observed and expected frequencies for each of the subtests as well as for total test scores, indicating that Piaget's spatial stages are not appropriate for this total group of children.

Further chi-square analyses were also conducted to determine differences between theoretically expected and observed distributions on total test score and all subtest scores for the various subsamples; boys and girls, urban and rural children, and upper and lower socioeconomic status children. Results of these analyses indicate that with few exceptions, significant differences between expected and observed frequencies occur for all groups, and for all

subsections of the Geographic Stages Test, giving additional support to the contention...that Piaget's spatial stages do not adequately describe these samples of children.

The hypothesis of no significant differences between subsamples for total test score and all subtest scores on the Geographic Stages Test was tested using separate one way analyses of variance. Separate analyses were computed using all the subtest scores and the total test score on the Geographic Stages Test as dependent variables. These separate analyses of variance were computed for each of the independent variables of age, sex, residence, and socioeconomic status. Again, with a few exceptions, results indicate that no significant differences occur between these various subsamples. Results of these analyses are presented in Tables Three, Four, Five, and Six.

Correlational analyses were computed to determine the relationships between children's scores on the different subtests of the geographic Stages Test. Results are shown in Table Seven. As may be seen, all correlations are highly significant ($p < .001$). indicating that there are significant relationships between the various subscores on the Geographic Stages Test. This is to be expected since all subtests measure what may be considered different aspects of similar content and relationships.

Correlational Analyses were also computed to determine the relationships between children's scores on the Geographic Stages Test and the Logical Thinking Test. Results of these analyses are presented in Table Eight and Table Nine. As may be seen, all correlations are significant. It will be noted that for the single

classification subtest, correlations with the subtests and total test score of the Geographic Stages Test are low, while higher correlations are evident between multiple classification abilities and the Geographic Stages Test. The highest correlation may be noted between the class inclusion abilities and the Geographic Stages Test. This is probably to be expected since Piaget notes that these abilities are at the heart of spatial stage progression. Thus, results of the analyses indicate that significant relationships do exist between children's scores on the Geographic Stages Test and the Logical Thinking Test.

To test the hypothesis that there would be no significant relationship between variables of age, sex, SES, and residence with total score on the Geographic Stages Test, a stepwise multiple regression analysis using total score on the Geographic Stages Test as the dependent variable was computed. The results of this analysis are presented in Table Ten. A relationship of .72 ($p < .001$) was found between age and the dependent variable. All other relationships were not significant. Thus, the independent variable of age explains approximately fifty percent of the variance in the dependent variable. All other variables explain relatively insignificant amounts of the variance in the dependent variable, with the most additional variance being explained by the independent variable of socioeconomic status (4%). The hypothesis of no significant relationships between these variables and total geographic stage score should be rejected since the variable of age alone accounts for half the variance in the dependent variable. Total rejection of the hypothesis should be done with caution however, since the other independent variables predict such an insignificant amount of the variance for the dependent variable.

Discussion

With minor exceptions, the hypothetical frequencies do not adequately describe the stage performance of this group of American children. Major discrepencies may be noted as a result of the chi-square analyses. Eight and nine year old children seem to be much more evenly spread between the stages than would be expected. This suggests that Piaget's description of children progressing through a transition stage may not be entirely accurate since results indicate that far fewer children are in this stage than would be expected. It may be that this particular result reflects Piaget' notion of a wide range of latitude for any given age of children. This middle age group may actually be spread about evenly over stages I, II, and III. This possibility has also been suggested by several of the previous investigators (Jahoda, 1964; Stoltman, 1971; Rand and Towler, 1973).

Another noticeable trend is that older children seemed to progress through the stages at a slightly faster rate than expected. Further, this age group showed less differential performance between subtests than did the younger children, who were much more likely to vary in their performance from subtest to subtest. Further, younger children progressed through the stages slightly slower than expected, in opposition to the rate for the older children.

Different rates of progression through the spatial stages are also evident when examining children's performance on the various subtests. By far the easiest subtest for children appears to be the Nationality Stages Test. Previous investigators (Jahoda, 1964; Rand and Towler, 1973) have also noted this and suggested that this is in opposition with Piaget's original formulations. Results

also indicate that most children seem to do better on understanding of spatial stages through circle and prop manipulation than they do on expressing these relationships verbally. Rand and Towler, (1973) also noted this tendency and suggested that while these results seemingly contradict Piaget's original assertions about spatial stage development, they do, in fact, relate to general Piagetian theory for Piaget states (Piaget and Inhelder, 1964) that many children are able to demonstrate concrete operations before they are able to explain these operations verbally. This seems to be entirely plausible for the results of this study as well.

By far the most difficult concept in the test for the child to grasp was that of foreigness. Further, almost no children were in the transition stage, which suggests that once a child understands what a foreigner is (identification), they understand the concept that it is entirely possible for them to be a foreigner in another country. The difficulty with this concept may be that it is not simply an inclusion relationship among concrete political territories, but rather, a highly abstract reciprocal relationship which includes both inclusion and multiple classification.

Several possible explanations exist for the differences between children tested in this study and those examined by Piaget. Differences in sampling and criteria used for stage placement may have contributed to these differences, but since differences were noted for almost all subtests and for all subsamples, it is probably true that more than just sampling error or placement criteria were involved. This is especially evident because of the

fact that all possible criteria were involved in actual stage placement, and none of these criteria result in a similar age "fit" to that reported by Piaget. Another possibility is that the statistically generated hypothetically frequencies are not an accurate reflection of Piaget's stages, but as Stoltman points out, any attempt to alter frequencies in one cell would lead to greater discrepencies in other cells, and thus increase the overall chi-square value.

It may also be possible that Swiss children have wide differences in cultural and educational experiences from American children. However, some doubt may be cast on this assumption since Piaget's stages do not seem to adequately represent Scottish children either. Travel and home experiences may have also played a part in these differences, but it was beyond the scope of this present study to examine this relationship.

Results of this research indicate variance from Piaget's spatial stages, most particularly in the frequencies of children in any given stage at a certain age. However, Piaget's spatial stages cannot be discounted entirely, for Piaget has noted that wide individual variations do exist for any given age and stage, and this research would seem to support that view. There is still plausible evidence that children do progress through their understanding of territorial and spatial relationships in a manner similar to that suggested by Piaget. A major contention seems to be that since Piaget's criteria are somewhat unclear, differences among samples of children would be more easily distinguished if explicit guidelines and precise figures had been reported by Piaget.

Results of the analyses indicate that age seems to be the major determinant of progression through stages. Both chi-square analysis and the analysis of variance indicate significant differences according to the independent variable of age, which does give support to Piaget's contention of age-stage relationships. While few significant sex differences were noted, it should also be apparent that a clear trend was established. Boys performed better than girls on all subtests and on total test. This is in agreement with previous research by Jahoda and by Terman and Tyler (1954) who report sex differences on general geographic achievement measures.

The finding of no significant differences between rural and urban children, except for the Nationality Stages subtest, is in contradiction to previous research. Again, however, the trend of urban children outperforming rural children was clearly established. It may be that since county was used to determine rural children's conception of inclusion for the nationality stages test in opposition to city for urban children, that county children did more poorly since county was by far the most difficult concept for children to grasp of all the territorial units used.

Additional support for the contention that age is the primary determinant of stage progression is given by the results of the regression analysis. The only significant correlation between any of the independent variables and Geographic Stage performance was age, which accounted for half of the total vaiance in the dependent variable. While this seemingly contradicts previous research by Stoltman (1971) it may be postulated that the magnitude of SES differences in this sample of children is much less than that

reported by Stoltman, leading to few differences among socio-economic groups, which is then reflected in the analyses.

Intercorrelations between the subtests and total test score for the Geographic Stages Test were all highly significant. This suggests that the subtests are measuring similar content although perhaps in slightly different ways. This is perhaps to be expected since the first four subtests, which were by far the most highly correlated, are all attempts to follow one or more of Piaget's procedures for determining spatial stage progress. The lowest intercorrelations for any of the subtests are those between the Foreigness Stages subtest and other subtests. This suggests that this test is measuring something moderately different from the other subtests. Overall, it would appear that the test exhibits a rather high degree of content similarity, but that the subtests are measuring somewhat different functions of that similar content.

Correlations between the two tests indicate that the single classification measures have the least amount of relationship to geographic spatial stage progress, but this is to be expected since the classification abilities required for the Geographic Stages Test are not generally considered single classification abilities. More precisely, these abilities would be classed a multiple classification abilities, and support for this assertion is provided by the fact that the intercorrelations for the two multiple classification subtests, as well as the double and triple attribute scales correlate more highly with Geographic Stage Test performance. This would seem to provide some evidence for a relationship between children who are able to classify according to multiple attributes and children who are able to classify geographic units in order to be able to understand the relationship between

them.

However, according to Piaget, the primary ability necessary for understanding for spatial relations is that of class inclusion, and this theoretical assertion is given strong support by noting that the highest correlations appear between the Class Inclusion Subtest and the various subtests of the Geographic Stages Test. This indicates that there is a fairly strong relationship between the general ability of class inclusion and that of spatial and territorial inclusion. It should be noted that children were only required to demonstrate concrete inclusion concepts on the Test of Logical Thinking while highly abstract inclusion relationships were called for on the Geographic Stages Test. Had abstract concepts been examined in the Logical Thinking Test it is entirely possible that these correlations would have been even higher.

Further support for the high degree of association between the two tests may be noted by examining the relationship between the total score on both tests. The relationship is what may be best described as moderate to high ($r = .61$) which does indeed suggest a rather strong relationship between general classification-class inclusion abilities and those of territorial and spatial inclusion relationships. Since the Logical Thinking Test was based upon general class inclusion abilities, it is only logical to assume that these abilities influence the special class inclusion abilities required by the Geographic stages Test rather than the reverse.

Implications

Several implications for curriculum and educational practice may be drawn from the results of this research. If students progress through age-stage relationships in their knowledge of geographical concepts, it would seem feasible to design curricular sequences based upon these age-stage developments. Implicit in this assumption is the necessity for ascertaining the developmental level of the child to determine in which stage level the child belongs. It would be foolish to try and teach the child something that he is cognitively unable to comprehend.

Teachers should use activities and techniques which would be designed to take advantage of the child's particular developmental level. Children should be given information about geographical knowledge and concepts in a form that is most meaningful to them. Thus, if the sequence of geographic knowledge proceeds from the child's immediate vicinity outward, curricular sequences and instructional materials and methods should be designed to take advantage of this particular learning pattern.

Children should also be given a greater opportunity to demonstrate complete understanding of concepts, especially since this research indicates that children are often not able to buttress verbal performance with spatial understanding, or vice-versa. Further, as Jahoda has noted, children often give "parrot-like" responses to questions without being asked to demonstrate true conceptual understanding. The children should be given many opportunities to understand and to assimilate this information into his cognitive structures. Further, a wider variety of experiences and materials would most likely be beneficial in

obtaining this result.

Results of this study also indicate that children would probably benefit from guidance by the teacher in trying to understand classification and class inclusion tasks, since there is a strong relationship between the various abilities required for complete understanding of geographical and territorial concepts and relationships, and those of general classification and class inclusion. Work with general conceptions of sets and subsets would perhaps be beneficial to young children, as well as classification and class inclusion exercises in general.

Diagnostic implications are also apparent from this study since results indicate differing performance for various subgroups. The teacher should recognize these differences and make allowances for them in the course of instruction. In general, these results indicate that the individual teacher should become more aware of student's capacities and learn to correctly observe children to comprehend the child's level of development. Systematic observation of children's answers and conceptual framework is always beneficial, but it would appear to be doubly so in the areas of geographic learning and social studies in general since these subject matter areas rely heavily upon understanding of concepts and relationships that are not always easy to grasp, and are not as susceptible to concrete manipulation as are the sciences and mathematics areas. This is certainly true in the case of younger children.

Table 1

Expected Frequency Distribution for Piaget's Spatial Stages

Age	Stage I	II	III
6-7	70%	20%	10%
8-9	20%	60%	20%
10-12	10%	20%	70%

Table Two

Expected Versus Observed Frequencies for
Total Sample on the Geographic Stages Test and Subtests

	Age	Stage I	Stage II	Stage III
Expected	6-7	23.1	6.6	3.3
	8-9	8.6	25.8	8.6
	10-12	4.4	8.8	30.8
Observed Total Stage	6-7	22	8	3
	8-9	12	15	16
	10-12	0	4	40
$X^2 = 22.38, p < .01$				
Observed Verbal Stage	6-7	29	4	0
	8-9	22	9	12
	10-12	1	5	38
$X^2 = 44.95, p < .01$				
Observed Spatial Stages-Circles	6-7	23	5	5
	8-9	16	12	15
	10-12	1	3	40
$X^2 = 28.97, p < .01$				
Observed Spatial Stages-Props	6-7	18	9	6
	8-9	11	12	20
	10-12	1	3	-
$X^2 = 36.57, p < .01$				
Observed Nationality Stages	6-7	14	9	10
	8-9	8	12	23
	10-12	0	2	42
$X^2 = 63.32, p < .01$				
Observed Foreigness Stages	6-7	31	0	2
	8-9	29	3	11
	10-12	6	2	36
$X^2 = 85.74, p < .01$				

Table 3

One Way Analysis of Variance for Differences Between Age Groups on Scores of the Geographic Stages Test

Variable	Source	DF	MS	F
Verbal Stage	Age	2	45.20	92.71***
	Error	117	.49	
Spatial Stage-Circles	Age	2	20.65	43.46***
	Error	117	.48	
Spatial Stage-Props	Age	2	15.40	32.64***
	Error	117	.47	
Nationality Stage	Age	2	11.44	26.14***
	Error	117	.44	
Foreignness Stage	Age	2	25.29	48.09***
	Error	117	.53	
Total Stage	Age	2	21.75	51.14***
	Error	117	.39	

*** $p < .001$

Table 4

One Way Analyses of Variance for Differences Between Boys and Girls on Scores of the Geographic Stages Test

Variable	Source	DF	MS	F
Verbal Stage	Sex	1	5.21	4.41*
	Error	118	1.18	
Spatial Stage-Circles	Sex	1	2.70	3.39
	Error	118	.80	
Spatial Stage-Props	Sex	1	1.63	2.31
	Error	118	.71	
Nationality Stage	Sex	1	1.88	3.09
	Error	118	.61	
Foreignness Stage	Sex	1	.21	1
	Error	118	.95	
Total Stage	Sex	1	3.01	4.19*
	Error	118	.72	

* $p < .05$

Table 5

One Way Analysis of Variance for Differences Between Rural and Urban Children on Scores of the Geographic Stages Test

Variable	Source	DF	MS	F
Verbal Stage	Residence	1	.40	1
	Error	118	1.22	
Spatial Stage-Circles	Residence	1	2.70	3.39
	Error	118	.80	
Spatial Stage-Props	Residence	1	1.63	2.31
	Error	118	.71	
Nationality Stage	Residence	1	2.41	3.99*
	Error	118	.60	
Foreignness Stage	Residence	1	2.41	2.58
	Error	118	.93	
Total Stage	Residence	1	1.01	1.37
	Error	118	.74	

* $p < .05$

Table 6

One Way Analysis of Variance for Differences Between Upper and Lower Socioeconomic Groups on Scores of the Geographic Stages Test

Variable	Source	DF	MS	F
Verbal Stage	SES	1	1.36	1.12
	Error	118	1.21	
Spatial Stage-Circles	SES	1	3.37	4.26*
	Error	118	.79	
Spatial Stage-Props	SES	1	1.29	1.82
	Error	118	.71	
Nationality Stage	SES	1	2.08	3.42
	Error	118	.61	
Foreignness Stage	SES	1	4.33	4.73*
	Error	118	.91	
Total Stage	SES	1	1.32	1.79
	Error	118	.73	

* $p < .05$

Table 7

Correlations Between Subtests and Total Test
on the Geographic Stages Test

	Spatial Stage-Circles	Spatial Stage-Props	Nationality Stage	Foreignness Stage	Total Stage
1. Verbal Geographic Stage	.81***	.78***	.76***	.75***	.88***
2. Spatial Stage-Circles		.89***	.81***	.68***	.92***
3. Spatial Stage-Props			.83***	.63***	.92***
4. Nationality Stage				.60***	.86***
5. Foreignness Stage					.68***

* $p < .001$

Table 8

Correlations Between Geographic Stages Test and Logical Thinking Test

	Logical Thinking Test				
	Single	Matrix	Row & Column	Inclusion	Total
Verbal Stage	.27***	.54***	.44***	.65***	.66***
Spatial Stage-Circles	.36***	.53**	.43***	.56***	.64***
Spatial Stage-Props	.31***	.48***	.41***	.50***	.58***
Nationality Stage	.26**	.48***	.35***	.51***	.55***
Foreignness Stage	.20*	.45***	.47***	.60***	.60***
Total Stage	.28***	.47***	.43***	.57***	.61***

* $p < .05$
** $p < .01$
*** $p < .001$

Table 9

Correlations Between Geographic Stages Test and Attribute Subtests of Logical Thinking Test

	Logical Thinking Test		
	Single	Double	Triple
Verbal Stage	.27***	.47***	.53***
Spatial Stage-Circles	.36***	.46***	.53***
Spatial Stage-Props	.31***	.46***	.45***
Nationality Stage	.26**	.45***	.40***
Foreignness Stage	.20*	.44***	.50***
Total Stage	.28***	.45***	.48***

* $p < .05$
** $p < .01$
*** $p < .001$

Table 10

Stepwise Multiple Regression Analysis: Prediction of Geographic Stage Score Using Independent Variables of Age, Sex, Residence, and Socioeconomic Status

Variable	Simple r	Multiple r	r^2	r^2 change
Age	.72	.72	.52	-
SES	-.11	.75	.56	.04
Sex	.19	.75	.57	.01
Residence[1]	.11	-	-	-

[1]Residence was not entered in the final equation because of insufficient F level.

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